

ARIZONA SILVER BELT.

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THE MINING FIELD.

A Brief Portrayal of the Mining Industry of Arizona and the Great Southwest.

MINE AND MILL---SHAFT, CHUTE AND TUNNEL.

PROGRESS BEING MADE BY PROSPECTOR AND PROMOTER--THE MINING INDUSTRY THROUGHOUT THE GLOBE COPPER BELT--A WEEKLY RESUME OF TRANSPERING EVENTS TERSELY TOLD.

METHOD OF SAMPLING ORE AT THE GLOBE SAMPLER.

As it may be of interest to many of our readers to understand the method pursued in the sampling of ores. We have taken some pains to investigate the matter at the Globe Sampler, whose operations are conducted upon the same plan as the large public samplers of Denver, Colo. The first operation is the crushing of every pound of ore that goes to the mill, so that the largest piece shall not exceed one inch in size. From the crusher the ore passes into a belt elevator which carries it to the top of the building where it is dropped into a chute leading to the automatic sampler. This machine is an eight-inch pipe with four dividers or splitters inserted in the center. The first section divides the stream of ore into four equal parts, two of which pass to the ore bin and the other two fall into the second section where it is again divided as before--two parts passing to the ore bin and the other two to the third section. After passing the fourth or last section it is readily seen that by this system of consecutive halving fifteen-sixteenths of the ore has passed to the ore bin and one-sixteenth has been cut out for subsequent treatment. This small amount is the sample from which the value of the entire lot is determined. It is automatically conducted to the rolls where it is reduced to corn size. It is then spread on the floor and thoroughly mixed by shoveling. It is then quartered and the diagonally opposite quarters thrown into the ore bin. The remaining quarters are shoveled over again into a pile and quartered as before. This operation is repeated until there remains from ten to fifteen pounds on the floor. This must be further broken up, and is therefore put through the sample grinder where it is ground so that it will pass a 20 mesh screen (400 holes to the square inch). It is now placed on an oil cloth and rolled so as to thoroughly mix it once more, and then quartered as before, until there remains about one pound, which must be reduced still finer. It is therefore placed on a cast iron plate (backboard) and ground so that all of it will pass through an 80-mesh screen (6,400 holes to the square inch). It is then assayed and the value of the entire lot determined by this final amount. So accurate is the process that a resampling of the entire lot will give practically the same result; in many cases there will not be a variation of one-tenth of one per cent in copper in the two results. A visit to the Globe Sampling Works will be interesting as well as instructive to those who are not familiar with modern methods of arriving at the value of ores. The familiar signs "No Admittance" are conspicuously by their absence. Everyone is apparently welcome, and information as to the manner of working is cheerfully given. As the ore is being sampled the owners are allowed to take check of samples if they wish to. After the ore is sampled and assayed an offer is made for it by the works. If satisfactory to the owner it is paid for at once, but if not he can remove it and ship it himself to the smelter after paying the sampling charges. The sampling is guaranteed, and if the smelter returns are lower than the sampler's, the difference will be made up. The necessity for sampling works is evidenced by the fact that of 1,000 tons of ore going to the Denver smelters 990 tons pass through the public sampling works, and we should not be surprised to see within the next six months nine-tenths of the ore shipped from Globe passing through the Globe Sampling Works. All progressive mining men do it elsewhere and we expect to see them do it here. We were forcibly struck with one thing that could be made use of by the works, viz: The certainty with which an accurate sampling of a mine could be made by mining experts. Instead of taking small 5 and 10-pound samples, large working quantities, even to carload lots can be taken from the mine and sampled without going to the expense and delay of shipping to some smelting point, thus enabling one to determine the commercial value of a mine.

PLAIN VIEW COPPER MINES.

This group of mines which the American Mines Development Company, Limited, has bought from R. Welch, is about to take a prominent place among the valuable copper properties of Globe district. The group comprises two claims, situated about 12 miles in a southwesterly direction from Globe, and embraces several of the strongest copper-bearing leads in this section of Arizona. The veins on this property are all well defined and average from 10 to 40 feet in width and carry an average of 25 per cent copper, \$15 gold and 6 ounces silver. The main lead is on a contact between porphyry and granite, and the lead, so far as development work has gone, shows an abundance of carbonate, oxide and sulphide ores. It would be hard to find a group of mines better situated for easy and successful development than this property, as there is an abundance of wood, water, lime and iron close at hand. Miners and prospectors who have come in from that section lately unite in saying that this property has the best surface showing that they have met with anywhere in their travels. Considerable work has been done on these claims, and a large amount of good ore developed. The trend of the leads on this property is the same as most of others on this copper belt, running in an easterly and westerly direction. Development work on this valuable property is expected to be resumed within a few days under the management of Dr. O. B. Bachman, who intends to sink four deep shafts, besides pushing forward the work previously begun.

LOCAL MINING NEWS.

Charles Lucas has put a force of men on his mine, the Hot Tamale, situated four miles northeast of the Ray mine, on Mineral creek, and is getting out high grade copper carbonate ore for shipment.

Ed Thrasher and Con McCormick, well known in Globe, recently secured a lease on the Silver King tailings at Pinal, which they are working by the Russell flotation process and making it pay handsomely. There are about 3,000 tons of the tailings and the product is a 6,000-ounce precipitate.

James and Ed Whelan have established camp and begun work on their 300-foot tunnel contract at the Yo Tambien mine which will require about four months to complete. Superintendent George Calder also has a force employed and will sink the shaft to meet the new tunnel at the depth of 250 feet from the surface.

Geo. P. Andrews of St. Louis, one of the organizers of the Hawley Copper company who have a bond on W. P. Howle's group of claims, arrived last Monday, to remain for several months. Mr. Howle, while doing development work for the company on the Wetumpke mine, a few weeks ago, ran nine feet into a body of rich carbonate ore. Other members of the company are expected to arrive here by the first of June, and it is understood that development work is to be vigorously prosecuted the coming summer.

The Black Warrior Copper Company, Amalgamated, are running their leaching works day and night and everything about the plant works perfectly. However, the company has discovered that they will be unable to make any money until they get their own acid plant installed, as acid shipped in costs \$40 per ton, and they expect to be able to make it at their works for \$6 to \$10 per ton. Twenty tons of acid per day are required for the leaching works. The company are now opening up sulphide ores on Gold gulch, from which they expect to make their own acid.

J. B. Hoeker, who arrived from the north today, brought in several large specimens of sulphide ore from the Cracker Jack mine on the East Verde. The ore is phenomenally rich, the copper value being estimated at 60 per cent. The whole face of the drift is said to be in ore of this character. W. P. Morey's big team will be in next Saturday with five or six tons of ore from the Cracker Jack mine, which is expected to equal the last lot sold to the Globe Sampler, which went 31.6 per cent copper. In the drift where the new strike was made the ore in sight is estimated at 15 tons.

Territorial and General.

The deepest bore in the world, says Mr. C. Rundel, in a late communication to the Industrial society of Mulhouse, is one of 6,571 feet below the surface of the soil, made at Parnscho-

witz, near Hybrick, Upper Silesia. The previous record for depth was the 6,133-foot hole drilled some years ago at Schladebach, near Leipsig.

The 20-stamp addition to the Mammoth mill has been completed and the whole 70 stamps are now dropping regularly.

John Krooman, Lee Borgstrom, John Williams and J. L. Bellinger, four miners employed at the Spray shaft of the Copper Queen mine, were injured on Saturday night by a blast. They had put in several shots and had failed to count the number of reports. A slow fuse in one of the holes held back the blast until the men were almost over it, when it went off. John Krooman is the most seriously injured--it is thought fatally. The others in some miraculous manner escaped with a few cuts and bruises. Bisbee correspondent of the Tombstone Prospector.

Last summer, while Engineer A. T. Colton was extending the Gila and Salt river base line, he found a large vein of gold-bearing quartz, says the Arizona Blade. He did not have time to prospect it, but got a cattleman living near by to locate it and do the location work for an interest in it. A few days ago he received assay certificates from the rancher showing that the quartz is rich in the yellow metal. He will not disclose the whereabouts of the find till he has time to go and locate the extensions, as the vein crops out several thousand feet in length.

George Lockwood, one of the luckiest chloriders that ever stuck a pick in the ground, is again in a bonanza, says the Mohave County Miner. Some time ago he took a lease on a portion of the G. A. R. mine, at White Hills, and went to work on a spot that was not considered very good. The first shot he put in brought out ore as rich as ever the White Hills produced. He is now, it is said, taking out one thousand dollars per day and the big body of ore shows no diminution. The G. A. R. was the one big producer in the White Hills years ago and Lockwood's strike may again bring it into prominence.

John Hayes Hammond, the South African mining millionaire, encouraged to do so by Senator Jones of Nevada, may possibly become interested in Yuma county's development. His representatives, Messrs. Webb and Moore of California, recently conducted a cursory preliminary examination of the Del Monte group of mines near Harrisburg, and it is said were quite well pleased. These properties consist of huge bodies of low grade ores, entirely free milling. Mr. Hammond, it is claimed, is looking for nothing better than an average \$1 ore, and it is upon this basis that the Del Monte group will be tested. These claims were sold two years ago by William Boes of Harrisburg, to S. W. Dorsey, for a small consideration, but it is understood that the latter thinks well enough of them to hold them very high.

Los Trigos mountain, near the Colorado river and about twelve miles from Ehrenburg, is the scene of a recent placer discovery of note. Amos Adams, George Muncey, A. V. Wilson, Elliott Stewart and eight or ten other well known miners are on the ground, and are making big wages. Nuggets from \$1 to \$15 in value are of quite frequent discovery, several of the men finding sufficient gold to net them an average of \$10 per day. On two or three different occasions lately, two ounces and a half of gold has been taken out in a day by a single man. As most of the gold is very coarse it is saved, in large part, by the miners simply scraping the bed-rock and picking up the nuggets exposed thereby, the finer gold being afterward saved by the dry washer method. The placer deposits of the Trigos have in years past yielded large amounts of gold, but have not been very much worked of late. As the discovery which is now yielding such good returns to a few men is somewhat removed from the old diggings it would indicate that not all the good placer ground in the Trigos has as yet been found. Yuma Sun.

As reported from New York, the latest consolidation of copper properties will include a number of Mexican and United States mines, and will probably be known as the Pan-American Copper Syndicate company. One of the interested parties is quoted as saying: "It will be put on a conservative basis. The aggregate capitalization of the companies to be merged is over \$70,000,000, and the new corporation which takes them all in will be capitalized only at \$15,000,000 to \$18,000,000." The Mexican properties include, among others, the San Luis mine at Durango (Mex.), the San Luis mine at Chihuahua (Mex.), the San Anito, comprising four of those classed in the Boleo group, and located at a village called Cabbobula, and the San Pedro of San Pablo (which is the capital of the state of Durango as Chihuahua is the capital of the state of Chihuahua). Most of

the mines in the Boleo group are said to be controlled by the Rothschilds, but not any of these come into the combination. One of the American companies to be absorbed is the Arizona Eastern and Montana company, which has mines at Tombstone, Cochise and Mayer (A. T.), and runs a smelter at Bigbug postoffice (A. T.), which it leases from the old Commercial Mining company, controlled by Phelps, Dodge & Co. of New York.

The deepest hole ever dug in the earth for men to work in is the shaft of the Red Jacket copper mine at Calumet, Mich., says the Mining & Scientific Press. Observers ascending in compartment balloons have secured data of importance regarding meteorological conditions, and underground observations made at a depth of a mile are no less valuable. It had been thought that such a depth at the bottom of the Red Jacket shaft would have a temperature that would boil an egg. This was found not to be the case, however. Careful tests at the bottom show that the normal temperature at a mile below the earth is only 57.5 degrees Fahrenheit. The water found at the bottom of the shaft is corrosive to human flesh. Workmen have to wear heavy rubber boots and rubber coats and masks to protect themselves. The opening is 15½ by 25 feet inside the timbers, cut through adamantine. Giant timbers secure the transit ways for men and materials, for water and electric wires, which illuminate the shaft from surface to bottom. Inside the timbers are six compartments. In four of the compartments slip up and down the ponderous cages, carrying ten-ton loads of rock and moving at the speed of an express train. Up and down in these cages also ride the hundreds of men who work in the mine. In one of the compartments are the great iron pump pipes. In the last will be forced steady currents of compressed air, which runs the drills a mile below the engine house. The electric light plant is large enough to supply light to a city. A telephone system connects every point of the shaft with a great central exchange above ground. A network of wires stretches in to the headquarters of the fire department, near the big hole. Thousands of dollars have been spent to bring every part of the shaft within easy communication of the surface in case of fire.

From a paper on "The Treatment of Copper Mattes in the Bessemer Converter," read by Prof. James Douglas before the London Institution of Mining and Metallurgy, we reproduce the following: The Copper Queen management has investigated the trough or barrel type of converter at the works of the Societe Metallurgica d'Italia, Leghorn. Here small converters of this design, tilted by hand and capable of blowing up about 30 cwt. of copper from 33 per cent matte tapped directly from the cupola, were seen to be making copper under a very low blast, and this type of shell recommended itself on that account as more economical than the vertical. The converters as designed by the Copper Queen company, by Messrs. Fraser & Chalmers on the same lines were estimated to be capable of holding on an average five tons of matte. They proved to be so efficient and economical that their adoption was followed in the three other Arizona works which have applied the pneumatic method, and, as already stated, one of the Butte works has decided to use them in preference to the vertical converter. The argument in favor of the trough and barrel converter is that the metal covers in a thinner layer a larger area, and therefore there is never the same depth of metal to be blown as in the vertical converter. Moreover, when copper has been formed the converter can be tilted, and the tuyers are on the same level and on one side only, and thus the air is driven only through the residual matte, and, therefore, not necessarily through copper already reduced to the metallic state. The trough converter as used at the Copper Queen, the Arizona Copper company and the Detroit Copper company are 8 feet in length by 5 feet 8 inches in diameter. They rest and are revolved on runners, and the blast is carried into the wind box through a pipe with detachable joints which occupies the position of a trunion in the vertical converter. The cover is made as flat as seemed consistent with safety in lining, and the mouth projects straight from the center of the shell--a somewhat objectionable feature, as it involves blowing vertically instead of laterally into the hood, a structural detail, however, which can be remedied to suit each converterman's views. The trough converter, being so much longer and lower than the vertical or cupola converter, adapts itself more safely to removal on a car than the vertical form. The Queen and Detroit companies have been using a car provided with a hydraulic plunger, on which the shells can be rapidly raised or lowered.

BLACK WARRIOR.

An Enterprise of the Greatest Importance to Globe Mining District.

THE MINES AND FINE REDUCTION WORKS.

AS DESCRIBED BY A PHOENIX REPUBLICAN REPRESENTATIVE. THE SUCCESSIVE STAGES IN THE HANDLING AND TREATMENT OF THE ORE FROM THE MINE TO THE FURNACE.

A representative of the Republican a few days ago visited the recently completed reduction works of the Black Warrior Copper Company, Amalgamated, near Globe, and was courteously shown through the plant, following the course of the ore from its delivery at the rock breaker through all the various stages of reduction to the refined ingots ready for the market.

The plant is a gigantic affair and has been erected at enormous expense, the works alone costing more than a half dozen mines generally referred to as bonanzas, but the management believes--and the ore in sight fully warrants it--that it is destined to be a producer of millions; such a property as in the end will prove the wisdom of having begun operations on a large scale.

As to ore bodies the company has three groups of twenty-five claims each, all prospecting well and any one of which bears evidence of concealing a fortune beneath the surface. Most of them are as yet undeveloped, but on the single claim which for the present will supply the plant some 200,000 tons of leaching ore, averaging 10 per cent, is blocked out. Of this at least no doubt can exist, for it is already in sight and if another pound is never uncovered the investment will still be a success. But so far as indications go there are mountains of it, practically an unlimited supply. The ores to be worked at present come from above the water level and require the leaching process, while below lies an incalculable body of sulphide ores which will demand other machinery for their reduction. This ore has been found in a deep shaft below the plant while the leaching ores come from a strata far above the works. On the hill side immediately back of the plant is the location of the original discovery, the vein cropping out on the surface. Clear around on the other side of the hill a mile and a quarter distant, apparently the same ore body crops out again and it is here the present mine, practically a huge quarry, is being opened up.

A narrow gauge railroad connects the mine with the works, being constructed on a slight incline, the grade being sufficient to propel the loaded cars by gravity. A gasoline engine of sufficient power to haul six empty cars back will shortly be placed on this track though at present mule power is employed.

At the top of the hill, rather above the plant, the first structures to greet the eye are two mammoth water tanks with a capacity of 30,000 gallons each and two reserve acid tanks. A short distance to the south the "fire department" which will be referred to later and between them run the tracks of the railroad from which the ore is dumped through the grizzly and rock breaker to the ore bin. It is then run through large rolls, further crushing it and regulating its size. Elevators similar to those of flour mills, only larger, raise it again to a considerable height, depositing it in a revolving screen, a unique cylindrical machine, in form resembling a section of a gigantic smoke stack, with one end slightly elevated and its surface perforated with holes through which the finer ore falls as the cylinder revolves. The coarser ore eventually finds its way out at the lower end of the cylinder, thus depositing the fine and coarse ores in separate bins, from which it falls through chutes to cars on a tramway just below, that extends the entire length of the building and immediately above the leaching tanks.

There are twelve of these tanks with a capacity of eight tons each and three having a capacity of fifteen tons each, making the full leaching capacity of the plant 141 tons. Along this tramway the cars are pushed to whichever tank is desired and emptied in a twinkling.

The leaching solution composed of sulphuric acid and other ingredients, the secret of which remains with the company, and is covered by patents, is then turned into the tanks through pipes and hose so adjusted that it can be supplied from both top and bottom. The copper is extracted by the solution taking a liquid form. When thoroughly leached the liquid is drawn off

into an immense storage tank and by an ingenious device the tanks are easily inverted when the tailings drop into chutes opening on the lower side of the big building, where cars on another short railway stand ready to receive them and carry them to the dump.

To return to the copper in solution. The liquid is then carried through gravity pipes to revolving precipitating barrels filled with scrap iron. As is well known, the iron precipitates the copper and in place of barrels of scrap iron their contents soon become barrels of copper precipitates, the residuum being carefully looked after by other machinery.

The precipitates are then trammed to the reverberatory furnace, smelted, refined and run into ingots of commercial size and practically pure. So pure in fact that no further refining is necessary and the product as it leaves the works is ready for the highest market price.

The leaching theory is a natural reasoning process suggested by nature. Below the water level the ores are sulphide, above water level the sulphuric qualities have escaped, leaving oxidized or crysocola ores. By placing sulphuric acid on the ores again the copper is released. Later, machinery will be installed to work both classes of ore simultaneously, what is lacking in one being supplied by the other.

In the upper part of the big building are the engine and boiler rooms, there being two fifty-horse power boilers, a 100-horse power Corlies engine and a large air compressor.

The fire department was referred to above. This is a little thing, perhaps, but it may mean much some day in case a fire should break out, situated as the plant is, miles away from any other means of help.

This department is a little house on the hill in which is placed a good pump connected at all times with the water tanks on the hill. A large hose is always connected and in readiness as this pump will be used for nothing but fire protection and can be instantly connected with the power house.

Referring to the plant again, a trial was made some time ago and everything worked satisfactorily save for leakage and some other minor defects. Since then all tanks have been lined with heavy sheet lead. The plant, it is understood, was started up about the first of the month and has now begun the work of giving the Black Warrior company returns for a fortune already invested. For water supply the company has until recently depended on a small well near the plant, but an underground stream of great proportions was not long ago found on the flats about four miles below and a big pipe line now furnishes an unlimited supply.

The ore bodies already opened up average 10 per cent and copper can be produced easily at 6 cents a pound, the refined product, commanding the highest price.

Surrounding the plant a little town is rapidly building up. The company has a good store with a large stock of goods, in one end of which is the post-office. A big warehouse, practically natural cold storage is excavated in the hillside, as also is the powder house.

An excellent boarding house is conducted and several residences occupied by the Messrs. Porter and Charles Fleming and their families, quarters for the men and a comfortable office where President J. A. Fleming holds forth.

W. C. Greene, head of the Greene Consolidated Copper company, Canaan, was here yesterday, says the Tucson Star of May 12, from his last stop in Bisbee. Mr. Greene said that the papers in the matter of the Cobre Grande are on file at the office of Barnes & Martin, and they are final as to the possession of the property. The Costello-Wood party can open up the case again if they so desire, he said.

Leadville reports that conservative estimates put April's output in gold, silver, copper and lead at 63,000 pounds, valued at \$1,050,000. This includes bismuth and zinc.